PROCEEDINGS OF THE CLUB

October 12, 1909

The meeting was called to order at the American Museum of Natural History, with Vice-president Barnhart in the chair. There were 22 persons present. Resignations were accepted from Miss Mary H. Price and Miss Mabel Denton. Mr. Leon L. Cypress was elected a member of the Club.

The program of the evening consisted of an illustrated lecture by Dr. John Hendley Barnhart. The paper has been published with slight modifications in the *Journal of the New York Botanical Garden* for August, 1909, and will appear in the next number of Torreya.

Percy Wilson,
Secretary

OF INTEREST TO TEACHERS

Liverwort Types for Elementary Classes

By W. C. Coker

In the liverworts we find the first conspicuous appearance of alternation of generations in plants, and it is here that it behooves the teacher to bring his pupils to a clear understanding of this fundamental morphological fact. All teachers of experience know that here we arrive at the *pons asinorum* of botany, but we should see to it that no student is kept on the wrong side by any unnecessary narrowing of the way.

In looking for a type, then, to use in our elementary classes it seems to me of the utmost importance that one should be selected that shows this alternation of generation in the clearest and simplest manner — as little obscured as possible by complex morphology. Now, if we examine the text books that are at present being used or that have been used for the last twenty years we find that the liverwort type is *Marchantia*, as complex and difficult a plant as the group affords, and one as little suited for this use as could well be found. The complex thallus, the stalked and still more complex archegoniophores and antheridio-

phores (names repulsive enough to any student), the hidden antheridia, and the small sphorophytes with their delicate vestments difficult to demonstrate, make *Marchantia* a formidable object to the beginner. His mind becomes so crowded with detail that he is apt to overlook the fundamental relations.

Contrasted with *Marchantia* let us take such a type as *Pallavicinia*. In FIG. 1 is shown in the same section a longitudinal

FIG. 1. Cross-section of female gametophyte of *Pallavicinia Lyellii*, showing involucre, perianth, archegonium, and young sporophyte.

view of the young sporophyte and transverse view of the gametophyte. All parts are shown and their relations are absolutely clear. Take four such sections at different ages, beginning with the mature archegonium, and the whole subject of alternation is presented. The gametophyte is so simple that it can be understood at once and the sphorophyte is so large and conspicuous as to prepare the student for the next step. The male plant is equally simple, and the antheridia can be seen with the naked eye without any dissection. A cross-section of the male plant through an antheridium is shown in FIG. 2. The only deficiency of *Pallavicinia* is the absence of gemmae, but for the study of

hese another thallose liverwort such as *Metzgeria* may be used. In this plant the gemmae are borne abundantly on the slightly incurved margins of the thallus.

FIG. 2. Cross-section of male gametophyte of *Pallavicinia Lyellii*, showing an antheridium.

For the study of the capsule and the relations of its contents I have found nothing that approaches *Frullania virginica* in clearness. Here, the elaters extend the entire length of the capsule and alternate with single rows of spore mother-cells.

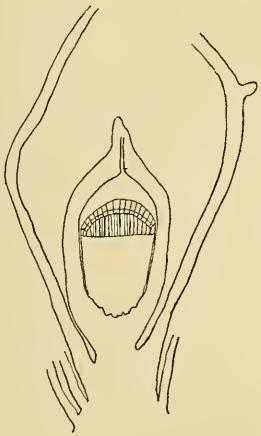

FIG. 3. Diagram of young sporophyte and surrounding parts of *Frullania virginica*.

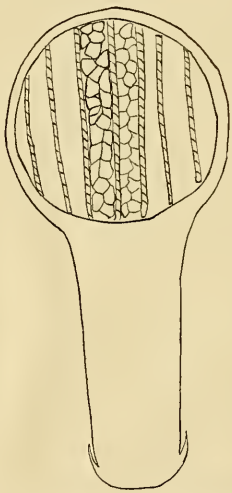

FIG. 4. Diagram of sporophyte of *Frullania virginica*. (Spores represented in two middle rows only.)

The homologous origin of these two elements is thus very clearly brought out, especially if a younger stage be studied. In FIG. 3 is shown a capsule of this species at an early stage. The spore-bearing portion is represented by a palisade of long undivided cells not yet differentiated into elaters or mother-cells. This sec-

tion, when compared with FIG. 4, brings out clearly the structure of the mature capsule and the relation of its parts.

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More teachers should receive the monthly list of publications sent, without charge, to all who apply for it by the Division of Publications of the United States Department of Agriculture. This four-page announcement gives a long list of the latest circulars and bulletins on agriculture and economic plants, on forestry and soils; many of them are very useful as references in teaching botany, zoölogy, and nature study.

Science for October 22, 1909, contains a short article by Professor John W. Harshberger on the plant remains of Pompeii. A study of the plant specimens exhibited in the National Museum at Naples yields the following list, which Professor Harshberger says is doubtless incomplete, representing probably the plants to be found in the markets in August (the date of the eruption being August 24). The plants are almond, chestnut, filbert, pine seeds, and walnut; apple, carob, fig, grape, and pear; barley and millet; onion, garlic, bean, and lentil.

The basket willows, according to a recent Farmers' Bulletin (No. 34, United States Department of Agriculture), was introduced by some German immigrants into New York and Pennsylvania about sixty years ago. The most rapid spread is through the non-arid parts of the southwest, where at least three species are commonly grown.

The United States Forest Service, according to *Science*, is planning to introduce a number of the more important eastern hardwoods into California, and "will this year experiment with chestnut, hickory, basswood, red oak and yellow poplar or tulip trees. Small patches of these trees will be planted near the forest rangers' cabins on the national forests, and if these do well larger plantations on a commercial scale will soon be established on wider areas. There are over 125 different species of trees in

California, a number of which produce some of the most valuable varieties of lumber in the country. Although considerably over one half of the species are hardwood or broad-leaved trees, yet, with the exception of the exotic eucalyptus, there is not a single species of hardwood here ranking in commercial importance with the leading eastern hardwoods. Climatic conditions in many parts of California are favorable for the growth of a number of the valuable hardwoods, and the absence of these trees is due mostly to unfavorable factors of seed distribution."

Professor Milton Whitney, chief of the soils bureau of the Department of Agriculture, has recently issued a bulletin showing that the long-cultivated soils of the leading nations are not only producing greater crops than at any earlier period, but are producing much more than the comparatively new soils of the United States. The average wheat yields (1897–1906) were 32 bushels an acre in Great Britain, 28 in Germany, 20 in France, and barely 14 in the United States. In the last twenty-five years the average yields of wheat in Germany have increased from 18 to 30 bushels an acre, of rye from 15 to 25 bushels, and of oats from 28 to 55 bushels. Similar statistics for other countries sustain the same view, and a study of American crop statistics for the last forty years shows that there is no general decrease in yields. These statistics also show that the older states whose soils have been longest in use are producing the largest yields. Even the soils of New England have materially increased in yields of corn and wheat in forty years; but what is more remarkable, they are producing considerably heavier yields than the soils of the Mississippi Valley states (*e. g.*, wheat 18 bushels an acre against 13 bushels for the forty-year average).

Another recent article by James J. Hill in the World's Work makes an appeal for the conservation of the soil fertility, giving as an instance of this need the striking contrast between the soils of France and Spain. Both countries have been cultivated for a very long time. One of them is exceedingly fertile and is rich and prosperous. The other is chiefly sterile and is poor and unprosperous. While it is quite true that New England produces far more wheat by the acre than any western state, it is also true

that New England contains many so-called abandoned farms which produce little or nothing. "The lesson, writ large on every field, is this: That it is not the length of time during which land has been cultivated, but rather the manner in which it has been and is cultivated, which determines its productiveness." For Mr. Hill points out that while the richest virgin soil is not so productive as the carefully tilled and fertilized soil of old settled places, a few seasons' cultivation suffices to exhaust either if their fertility is not replenished.

In discussing the "demonstration" work now being conducted in various states by the United States Department of Agriculture, the *Outlook* says: "It is not difficult to persuade the farmers of the desirability of increased crops, but it is difficult to persuade them that it can be done. Finally, one or more farmers in each district are persuaded to work a few acres in accordance with 'use as directed.' The demonstration farmer must do all the actual work himself. Therein lies the force of the argument. What he can do his neighbors will believe they can do. Each month specific instructions are sent to each demonstrating farmer. Each month, too, a local agent visits him and gives word-of-mouth instructions. Notice is sent to all the co-operating farmers to meet the agent on a given demonstration farm, where the crop and plans are exhaustively discussed. This is called a 'field school.' In these discussions it has been found with pathetic frequency that many small farmers had never fully complied with any of the essential rudiments of successful farming. Year after year they had gone on charging their perfectly avoidable failures to the land or the elements. One of the converts to the new farming thus frankly expressed himself at a public meeting in Alabama last year: 'I was born in a cotton-field and worked cotton on my farm for more than forty years. I thought no one could tell me anything about raising cotton. I had usually raised one-half a bale on my thin soil, and I thought that was all the cotton there was in it in one season. The demonstration agent came along and wanted me to try his plan on two acres. Not to be contrary, I agreed, but I did not believe what he told me. However, I tried my best to do as he said, and at the end